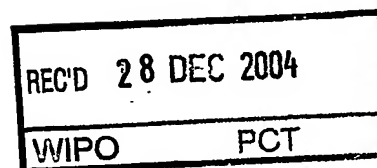


PCT/NZ2004/000304



## CERTIFICATE

This certificate is issued in support of an application for Patent registration in a country outside New Zealand pursuant to the Patents Act 1953 and the Regulations thereunder.

I hereby certify that annexed is a true copy of the Provisional Specification as filed on 26 November 2003 with an application for Letters Patent number 529771 made by Wyma Engineering (NZ) Limited.

Dated 13 December 2004.

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Patents Form No. 4

Patents Act 1953

Provisional Specification

**A DRIVE MECHANISM**

We, WYMA ENGINEERING (NZ) LIMITED of cnr Weedons Ross Road and State Highway 73, West Melton, RD 6, Christchurch, New Zealand, a New Zealand company do hereby declare this invention to be described in the following statement:

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## **A Drive Mechanism**

### **Field of the Invention**

The invention relates to a drive mechanism and particularly to a drive mechanism for food handling and cleaning equipment.

### **Background to the Invention**

In the food handling industry there is currently available for washing vegetables such as carrots, potatoes, and parsnips equipment which is best be described as a rotary barrel brush washer. This equipment is of recent conception and was designed as a replacement for existing pressure washers, flatbed washers and a standard barrel washer. This new rotary barrel washer combines traditional product agitation of a standard barrel washer with brushes which are formed on shafts that counter rotate. The axes of the shafts supporting the brush bristles are generally aligned to the longitudinal axis of the barrel and are positioned around the inner periphery of a barrel in which the produce is cleaned.

A difficulty with the new rotary barrel washer is that the environment in which it is used can result in considerable wear to whatever drive mechanism is incorporated to drive rotation of the plurality of counter rotating shafts on which the brushes are mounted. The environment includes water and dirt washed from the produce and this makes it necessary to adopt a drive which can withstand such conditions. At present in equipment on the market two separate drive motors are included for rotating the shafts on which the brushes are mounted. A third drive motor is included and this is adapted to drive rotation of the barrel by way of a chain drive or toothed belts. The two drive motors for the brushes drive through gear boxes chain drives to rotate the shafts on which the brushes are mounted. The drive motors are mounted

spaced apart on opposite sides of a chassis so that the chain drives are wrapped around sprockets on the ends of the shafts so that at any one time each sprocket is being driven by at least one of the chains. In an alternative a single drive motor has been used and this drives a timing drive belt and a timing slave belt. In this context a slave or wrap belt is a timing belt which wraps round pulleys on the end of the shafts supporting the brushes (and is not connected to a motor. With the chain drive, this requires regular lubrication and regular attention to chain tension to obtain constant speed. The inclusion of two drive motors adds to both manufacturing costs and running costs and doubles the possibility of deleterious matter causing damage during operation. With the timing belt drive, the set up of the timing belts is very critical and time consuming to assemble, to avoid operational problems and premature wear. The cost of the timing belts is also very expensive.

An object of the invention is therefore to provide an alternative lower cost drive mechanism for known and new equipment which at least offers a useful alternative choice.

Further objects and advantages of the invention will become apparent from the following description which is given by way of example only.

### **Summary of the Invention**

According to a broadest aspect of the invention there is provided a drive mechanism for food handling and cleaning equipment incorporating a rotating barrel in which are mounted a plurality of shafts aligned with their longitudinal axes parallel to the longitudinal axis of the barrel, the drive mechanism including a single motor adapted to drive via a V belt drive the shafts which are also linked by a timing belt slave.

According to another aspect of the invention there is provided a drive mechanism for food handling and cleaning equipment incorporating a rotating barrel in which are mounted a plurality of shafts aligned with their longitudinal axes parallel to the longitudinal axis of the barrel, the drive mechanism

including a single drive motor adapted to drive via a gearbox and a number of adjacent V-belts at least some of the plurality of shafts, the shafts additionally including toothed pulleys or sprockets driven by a timing belt that ties rotation of all the shafts together to maintain constant rotation of the shafts under the drive of the single drive motor.

Each shaft has a pair of pulleys or sprockets the first of which is driven by the V-belts and the second of which is driven by the timing belt.

The V-belt drive may be by way of a plurality of separate V-belts or a single multi V-belt configured with a plurality of adjacent V shaped surfaces.

The timing belt may be a toothed timing belt adapted to drive toothed pulleys or sprockets on each shaft.

Further aspects of the invention will become apparent from the following description which is given by way of example only.

### **Description of the Drawings**

An example of the invention will now be described with reference to the accompanying drawings in which:

Figure 1 shows a perspective view from one end of an example of rotary barrel washer incorporating an example of drive mechanism according to the invention.

### **Description of the Example**

The example of the invention will be described with reference to the drive mechanism being incorporated into a rotary barrel brush washer for vegetables. It is to be appreciated that the drive mechanism can be used in a number of other situations such as for cleaning fruit, shellfish or a variety of

other produce. In such other situations it is acknowledged that the equipment incorporating the drive mechanism will be in many respects different from that shown in the example. The equipment will have the common denominator of requiring a drive mechanism for a plurality of shafts all of which are to be driven at substantially the same constant speed from a single drive motor.

In Figure 1 is shown a rotary barrel brush washer which in many respects is similar to the new rotary barrel washer described above. The rotary barrel washer includes a frame 1 manufactured from appropriate box section steel. The frame supports a barrel and brush assembly 2 the drive and rotation of which will be described in more detail below.

At one end of the frame is included a frame assembly 3 on which a drive motor 4 for the barrel is mounted. The drive motor 4 is connected via a gearbox 5 to a drive shaft on which a pulley 6 is mounted and on which a multi vee drive belt is fitted. The multi vee drive belt is adapted to drive rotation of the main drum of the barrel and brush assembly 3.

The frame assembly 3 also supports a drive motor and gearbox assembly 7 for driving the shafts 8 supporting the brush bristles. The shafts 8 are generally aligned to the longitudinal axis of the barrel and are positioned around the periphery of the main drum forming the barrel in which the produce is cleaned. The end of each of the shafts 8 supports a pulley 9 aligned in the same plane as a pulley 10 on the end of a drive shaft 11 of the drive motor and gearbox assembly 7. The end of each shaft 8 also supports a toothed sprocket or gear 12.

The drive from the pulley 10 to the pulleys 9 is via a number of V-belts 13 which are tensioned by a tensioner assembly 14. A constant rotational speed is maintained on all the shafts 8 by providing a toothed timing belt 15 on the set of toothed sprockets or gears 12.

In use a separate variable speed control (not shown) can be incorporated on both the brush and barrel drive motors 7 and 4 so that users can tailor the

condition of the cleaned end products to suit their initial condition and product type. In this way skin sensitivities are allowed for. This can result in a reduced need for a pre-cleaning system and a completely dirty product direct from a field can be used as the input.

The frame 1 can also include a means for adjusting the tilt angle of the drum to suit a user's requirements. The machine for a potato cleaning situation has low water consumption. For New Zealand conditions an average user can use 1500 to 3000 gallons of clean water per hour for a 15 tonne per hour cleaning process. A recycling of the water is possible and this can decrease the water required by 80 to 90%.

The main benefit of belts over chain is the one motor, no need to oil or adjust belts on a constant basis, better speed and quieter. This applies to both belt systems.

The main benefit of the V belt drive over the timing belt drive is cheaper cost and that the V belts do not have teeth and therefore they are not required to be tensioned, or to have the same set up tolerances as a timing belt drive. Because the slave belt is a timing belt, if a timing belt drive is used it has to be matched exactly with the timing belt slave in tension, pulley set up and the like which is a time consuming and expensive exercise. If this set up is not done properly it can lead to premature belt wear and failure. By changing to a V belt drive, the need for the belts to be matched in tension is removed. If the V belts slip it does not affect the timing slave belt in any way. It is so much simpler and easier to install and the belts are cheaper.

The inclusion of special vee belts and the addition of the timing belt therefore reduces maintenance costs despite the environment of water and dirt in which the machine is used.


Where in the description particular mechanical parts are mentioned it is envisaged that their mechanical equivalents can be substituted as if the were set forth herein.

Thus by the invention there is provided drive mechanism and particularly to a drive mechanism for food handling and cleaning equipment ,

A particular example of the invention has been described and it is envisaged that improvements and modifications can take place without departing from the scope thereof.

Wyma Engineering (NZ) Limited

By Their Attorney



Richard Lyth

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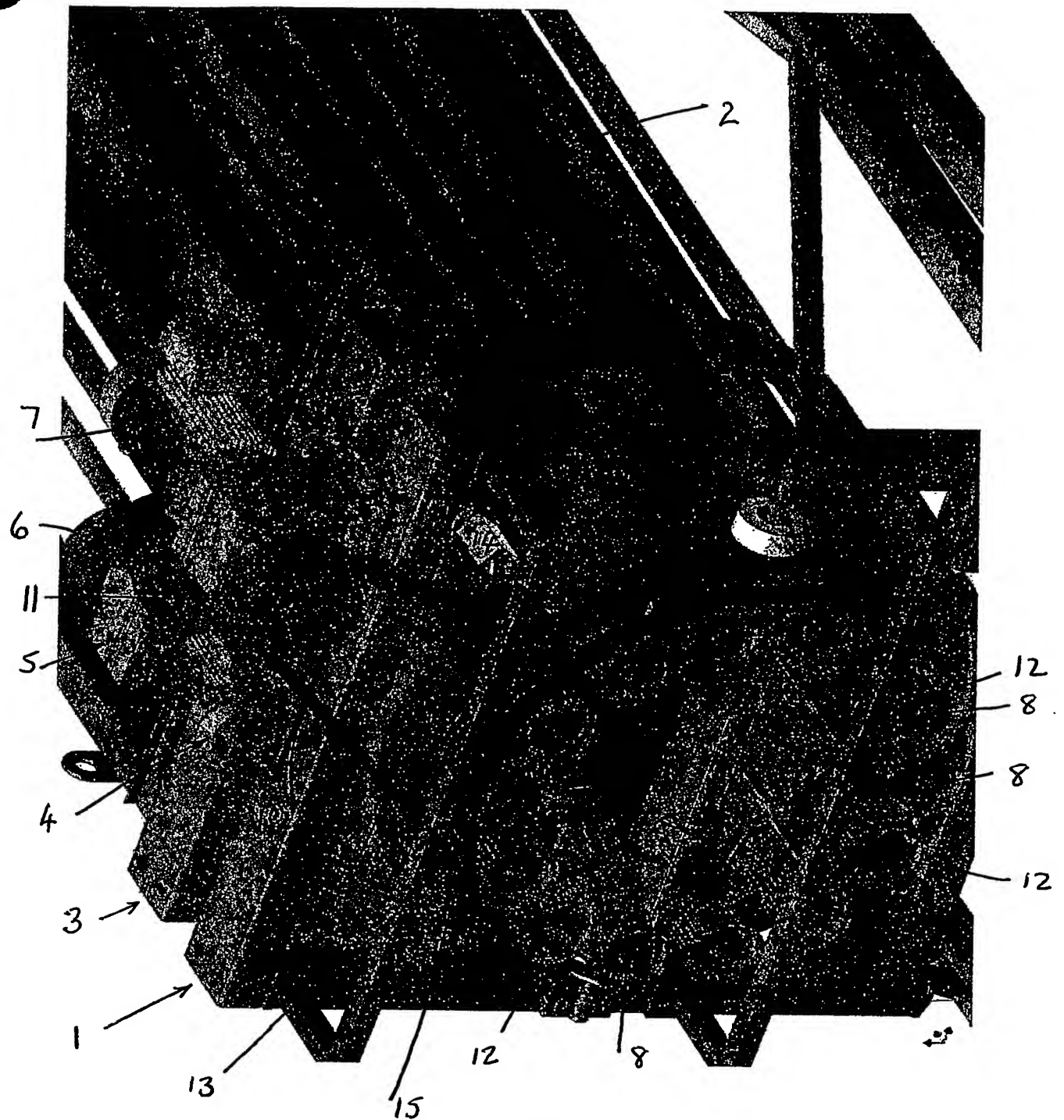


FIGURE 1

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